CERTIFICATE IN APPLIED DATA SCIENCE

INTRODUCTION

The Applied Data Science Certificate#provides students with an introduction to data analysis, including the theory and practical skills needed to collect and prepare data for analysis, explore and visualize data, build models and test hypotheses, discover insights, and communicate results in meaningful ways. The coursework builds on these skills and continues the development of strong statistical computing and programming skills by exposing students to "Big Data" topics such as deep learning, high-performance computing, text mining, machine learning, and AI applications in data analysis.

Through the practicum experience, students will work closely with a faculty member using real-world data to apply these skills to their interests in a semester long research project. To earn the Applied Data Science Certificate, students must complete#seven graded courses and the capstone Data Analysis Practicum.

CERTIFICATE REQUIREMENTS

To earn the Applied Data Science Certificate, students must complete seven graded courses and the capstone Data Analysis Practicum. Before admitted to the program students are asked to submit a tentative plan of study.

Code	Title	Hours
Select one of the following basic knowledge courses:		**1**
BIOL242	Quantitative Methods for the Biological and Environmental Sciences	
MATH132	Elementary Statistics	
PSYC200	Statistics: An Activity-Based Approach	
QAC201	Applied Data Analysis	
QAC211	Digging the Digital Era: A Data Science Primer	
QAC250	An Introduction to Data Journalism	
Select two courses from the following mathematical, statistical and computing foundation courses, each from a different group:		**2**
Mathematical Foundations		
MATH221	Vectors and Matrices	
MATH223	Linear Algebra	
MATH228	Discrete Mathematics	
MATH274	Graph Theory	
QAC220	Applied Vectors and Matrices	
Statistical Foundations		
ECON300	Introductory Econometrics	
MATH231	An Introduction to Probability	
MATH232	Mathematical Statistics	
Computing Foundations		
BIOL265	Bioinformatics Programming	
COMP112	Introduction to Programming	
COMP115	How to Design Programs	
COMP211	Computer Science I	
COMP212	Computer Science II	
Select two of the following applied data science courses:		**2**
QAC305	Exploratory Data Analysis and Pattern Discovery	
QAC385	Applications of Machine Learning in Data Analysis	
QAC386	Quantitative Textual Analysis: Introduction to Text Mining	
Select two credits from the following applied electives:		**2**
E&ES280	Introduction to GIS	
ECON385	Advanced Econometrics	
ECON386	Introduction to Forecasting in Economics and Finance	
GOVT366	Empirical Methods for Political Science	
GOVT378	Advanced Topics in Media Analysis	
GOVT380	Public Opinion and Polling Lab	
PHYS340	Computational Physics (0.5 credits)	
QAC216	Introduction to Survey Design and Analysis	
QAC231	Introduction to (Geo)Spatial Data Analysis and Visualization	
QAC239	Proseminar: Machine Learning Methods for Audio and Video Analysis	
QAC241	Introduction to Network Analysis	
QAC251	Data Visualization: An Introduction	
QAC251Z	Data Visualization: An Introduction	
QAC307	Experimental Design and Causal Inference	
QAC311	Longitudinal Data Analysis (0.5 credits)	
QAC312	Hierarchical Linear Models (0.5 credits)	
QAC313	Latent Variable Analysis (0.5 credits)	
QAC314	Survival Analysis (0.5 credits)	
QAC320	Applied Time Series Analysis	
QAC323	Bayesian Data Analysis: A Primer (0.5 credits)	
QAC356	Advanced R: Building Open-Source Tools for Data Science	
QAC378	DeltaLab: Computational Media Analysis	
can count QAC 380 or 381, not both		
QAC380	Introduction to Statistical Consulting	
QAC381	QAC Praxis Service Learning Lab	
NOTE: at least one of the electives should be a 300 level course		
The capstone Data Analysis Practicum that includes an ethics and epistemology seminar discussion as well as completing an independent data science project.		**1**

ADDITIONAL INFORMATION

- Some of the courses that count toward the certificate may have a prerequisite, such as calculus. These prerequisites do not count toward the certificate, and students attempting to complete the certificate are not recused from these prerequisites.
- Mathematics majors cannot count courses in the foundations groups already covered by their major toward the certificate. They must instead complete one course from the statistical foundations group and complete three applied elective courses. Alternatively to completing three applied elective courses, they can take either MATH232 or COMP212 and complete two applied elective courses.

- Computer science majors cannot count courses in the foundations groups already covered by their major toward the certificate. They must instead complete one course from the statistical foundations group and complete three applied elective courses. Alternatively, they can complete both MATH231 and MATH232 and complete two applied elective courses.
- It is strongly recommended that students who are not mathematics or computer science majors take courses in the computing foundations group to satisfy the certificate requirements. They can also substitute either MATH232 or COMP212 for one of their applied elective courses.
- Economics majors and minors cannot count ECON300 toward the certificate and must instead complete one course from each of the other two foundation groups.
- Students cannot count more than one course towards this certificate that also counts toward completion of any of their majors or minors.
- One course taken elsewhere may substitute as appropriate for any of the above courses and count toward the certificate, subject to the QAC Advisory Committee's approval (where routine approval may be delegated to the QAC director).
- Students can substitute a course from among the applied data science and applied elective courses for the basic knowledge course, subject to approval.
- Only graded courses can satisfy the requirements for the data analysis minor and the applied data science certificate. Courses completed with a CR/U grading mode will not satisfy the requirements of the two programs.
- Students cannot receive both the data analysis minor and the applied data science certificate.

CONTACT

Director of the QAC